# REVIEWS OF BOOKS

## GENETICS

**Kemp, T., Hauge, M. and Harvald, B.** (Editors). *Proceedings of the First International Congress of Human Genetics, Copenhagen, August 1–6, 1956.* Basel, 1957. Karger. Bound, pp. xvi + 970; 165 fig. Price Sw.Fr.141.

THE OPPORTUNITY of studying this report was particularly welcome to one who had not been present at the Congress in Copenhagen. Sponsored by committees of fourteen different nations outside the Iron Curtain, this Congress drew delegates from more than thirty countries, and it is evident from the number of papers and variety of their subject matter that an astonishing amount of ground was covered in the short time available.

The report of the proceedings is divided into five parts and as the parts are separately obtainable, it may be useful first to indicate briefly what are the different topics considered in each. Part I includes sections on mutation, radiation genetics, comparative experimental pathology, cytology—for example the determination of "cellular sex" and its application in medicine, studies of chromosome structure, etc. — and heredity in cancer. Part II is devoted to population studies and physical anthropology, Part III to the blood groups, including their application in ethnography, association with disease and forensic use. Parts IV and V, after a preliminary section on methods in human genetics are concerned with the role of inheritance in pathological conditions in man.

The *Proceedings* give a very fair, unbiased and widely representative view of both the trend of current thought and present state of knowledge in human genetics. For example, it is apparent from the opening addresses and from numerous references throughout the text that geneticists are much concerned with the hazards of a potential increase in radiation, yet the section on radiation genetics is comparatively small and reflects well the lack of detailed information on this subject. The World Health Organisation asks for "advice about the possibility of setting up a standard of recognition for one or more clearly recognizable medical conditions thought to be largely or solely genetic in origin" but the identification of such conditions and understanding of related problems is only just beginning (as Dr. T. C. Carter points out).

Another way in which the balance of modern research is reflected in the *Proceedings* is the "disproportionate association of human genetics with the pathological and abnormal" to adapt Mr. Scheinfeld's words. Certainly no aspect of medicine is neglected in the wealth of contributions in Parts IV and V! (One may cite as an example of the many excellent studies that of Allen and Kallmann on mongolism in twin sibships.) Professor R. J. Williams in a stimulating paper draws attention to the " vast array of biochemical items in addition to anatomical ones open to investigation by human geneticists" and one has only to glance through the tiny section on physical anthropology to agree with him that the genetics of normal human variation is as yet largely unexplored country.

A further indication of current opinion is found in Professor Tage Kemp's plea for a more general adoption of the registration of hereditary diseases on a national basis — important both for research purposes and in genetic counselling. The value of careful registration, for which the Scandinavian countries are particularly renowned, is exemplified in Dr. Tage Larsson's population survey and in the several follow-up studies of twins in Denmark and Sweden.

If, from the *Proceedings*, one had to pinpoint the discovery which had most influenced recent thought in genetics, that of Dr. A. C. Allison of the resistance of sickle-cell heterozygotes against falciparum malaria would probably be as good a choice as any. The implications of selection in favour of the heterozygote, of which this is the first example to be established in man are considered frequently in the *Proceedings;* Professor Penrose for instance stresses the importance of even slight heterozygous advantage in calculating the mutation rate for a rare recessive lethal condition.

Considering the individual papers rather than the *Proceedings* as a whole, many give an extension and elaboration of work already published; several give good accounts of present knowledge

of particular topics, for instance that of Dr. H. Lehmann on "Variations of Hæmoglobin Synthesis in Man", and others are interim reports on research in progress, examples being those of Dr. Cavalli-Sforza on breeding patterns of human populations and Dr. Norma Walker on the determination of zygosity of twins. A few contributions are summarized, being published in full elsewhere; in this connection it was a little disappointing not to have the unabridged versions of the two interesting reports from Israel in Part I. It was a pity also that there was so little discussion following papers, but obviously time was the deciding factor here.

These few general remarks may encourage students of human genetics to examine for themselves the *Proceedings of the First International Congress of Human Genetics*. Certainly for those interested in medical genetics the report is well worth having in its entirety, representing as it does the essence of current world opinion on the subject.

HELEN BLYTH

**Waddington, C. H.** *The Strategy of the Genes.* With an appendix by H. Kacser. London, 1957. Allen and Unwin. Pp. ix + 262. Price 28s.

THE FIVE CHAPTERS of Professor Waddington's book deal with form, end and time; the cybernetics of development; selection of, for and by; the organisation of the gene pool, and the survival of the adaptable. An epilogue on an epigenetic consideration of evolution is followed by an appendix on some physico-chemical aspects of biological organization written by H. Kacser. The book can be considered as an attempt at a philosophy of biology and in particular of genetics, embryology and evolution. This philosophy is opposed to the exaggerated atomism of modern genetics and to the hypertrophic statistics in the same field; its central theme is perhaps to be found on page 103, where a diagram contrasts the conventional view of the relations between environment, selection and genotype with Waddington's view, who in addition stresses the importance of environmental influences on the phenotype; while in Muller's view for instance the selective forces of an environment just affect gene frequencies — a process which may also be randomly distorted, the environment as seen by Waddington, can also directly act on the phenotypes, which thus are specifically determined both by the genotype and by the environment; the effect of environmental selection on gene frequencies is only secondary to this.

In situations where individual adaptation and mutation produce comparable results a sort of spurious Lamarkism can be the result. But such a situation is more reasonably described with Huxley who thinks that in such circumstances adaptative modifications hold the strain in an environment where mutations tending in the same direction will be selected. Another point stressed by Waddington is that organisms do not invariably react to an unalterable environment, but that they can sometimes influence or select it. It may be permissible to illustrate this point to the readers of this journal by an example from human biology actually not elaborated by Waddington. It is well known that the acquisition of literacy has had and is having a profound effect on the civilization and physical existence of many peoples. One might expect that different forms of intelligence might be advantageous in a literate society than among the illiterate. Insofar as such a difference is genetical one can see how literacy creates a new array of genotypes. But literacy could not have arisen in the first place if exceptional individuals had not pre-existed who were able to respond to the social forces of their environment by taking the several steps in the invention of writing.

Similar considerations of the complex and mutual interactions of environmental forces, phenotype and gene frequencies would appear more adequate than the mathematically tractable but quite unrealistic model of one way selection acting on random mutations.

A possible criticism of the book is that it combines the laboratory jargons of several specialities and introduces new terminology. A short sentence like "It is important to distinguish the inherent noisiness of a developmental pathway or creode from its canalisation" (p.40) incorporates words from the language of the communication engineer, the theoretical embryologist and Waddington himself. There are many such sentences.

It must have taken Professor Waddington some courage and effort to write this book with the